

OMS 621

Logistics

Amitabh Sinha

(Tentative syllabus; subject to minor revisions before finalization in January 2009)

Winter B, 2009

Objective:

Logistics refers to the planning, implementation and control of the efficient forward and reverse flow and storage of goods, services, and information between the point of origin and point of consumption in order to meet consumer demand. This course trains students in the various aspects of logistics management. Primary topics include the management of inventory, facilities, warehousing and transportation, with in-depth study of these individual elements as well as examination of integrated logistics strategy and network design. Other topics with ancillary coverage include sustainability in logistics, international logistics and globalization, competition and co-ordination, role of information flow and IT, etc.

Instruction will be by a combination of lectures, case studies and numerical assignments. Students will also run computer simulations of a logistics system, as well as learn to use a commercial logistics planning software. Guest lectures and a facility tour may also be included. The aim is to train students to perform and manage logistical functions within an organization, as well as assess and design the overall logistics strategy of the organization.

Instructor: Amitabh Sinha, E4605, x5-4182.

Pre-requisite: One of the following: OMS 618, OMS 301, OMS 502 or their equivalents. You may enroll in OMS 621 if you are concurrently pursuing one of the prerequisites.

No prior credit in OMS 620/320: You cannot enroll in OMS 621 if you have taken OMS 620 or OMS 320 in Fall 2008 or earlier. However, you may enroll in OMS 621 if you plan to take OMS 620 in Winter 2009 or later.

Meet: 10:20 am to 12:40 pm, Mondays and Wednesdays, in R2210.

Materials:

1. **Text:** TBA.
2. **Course pack:** This will contain 5 case studies, as well as an electronic certificate allowing students to participate in the supply chain game.
3. **Ctools website:** The course website will be on CTools. This will be used to post materials, handle assignments, post announcements, and various other pedagogic and administrative tasks. Other relevant readings will also be posted here.

Grading:

The final letter grade for this course will be based on three criteria, with the weightages of the three criteria given below:

Homework assignments	45%
Final exam	40%
Participation and case discussions	15%

The grade distribution will be according to the Ross School of Business distribution guidelines.

Learning Deliverables:

To facilitate active learning, there will be several assignments and case studies in the course. These are briefly described below:

1. **Supply chain game:** This is an online, web-based game, wherein student teams manage the supply chain of a fictitious company. Decisions to be made include inventory management at warehouses, production management at factories, transportation, capital investment in factory and warehouse capacity, and cash flow management. The game is played in two parts. The first part is a simpler version, and is played March 16–21, and serves to illustrate inventory management as well as raise awareness of more complicated issues that arise in a larger network. The second part is played over a more extensive network, over the dates April 13–18. The findings of the second part are discussed in the last lecture (April 20), and serve to wrap-up the logistics management tools learned throughout the course.
2. **LogicNet software:** LogicNet is a commercial software used for designing and managing distribution networks. Over the course of two half-lecture sessions, students will be trained in the software as well as given homework assignments where they use the software to make logistics management decisions.
3. **Case studies:** Lectures will include relevant case studies to supplement textbook and notes based instruction. Tentatively, 5 case studies have been identified, although this list may change before the course commences. The 5 case studies, together with discussion dates and topics taught are listed below.
 - L.L. Bean, Inc., Harvard Business School Case 9-893-003: March 16. Multi-product inventory management.
 - Frito-Lay, Inc.: The backhaul decision, Harvard Business School Case 9-688-104: March 23. Transportation (truckload).
 - Nova, Inc., Ross School of Business Case Study: March 30. Distribution network design.
 - RFID at the METRO group, Harvard Business School Case 9-606-053: April 8. RFID technology in logistics.
 - Walmart's sustainability strategy, Stanford Graduate School of Business Case OIT-71: April 15. Sustainability issues in logistics.
4. **Problem sets:** A total of 4 problem sets will be assigned during the length of the course. These will reinforce the concepts and tools taught during the lectures. Two of the problem sets will include exercises in the LogicNet software discussed above.

Students will do the case studies individually, while the other three components (supply chain game, LogicNet software, and problem sets) will be in groups of 3 or 4 students. For group assignments, all members will be awarded the same grade for each assignment, but peer evaluation forms and the instructor's discretion will be used at the end of the course to revise individual grades upwards or downwards if warranted.

Final Exam:

There will be one comprehensive final exam for the course, as scheduled by the Ross School of Business. The final exam will contain both numerical problems as well as qualitative questions, and question format will include some multiple-choice questions. Material for preparation will be provided at least one week before the final exam. A review session after the last lecture and before the final will be held if student demand for it is perceived.

Course Outline

Lecture I: *Introduction; Review of Inventory Management* *March 11*

- What is logistics?
- Role of logistics in overall supply chain management.
- Components of a logistics system: facilities, inventory, transportation, flows.
- Review of elementary inventory theory: newsvendor formula, economic order quantity, continuous and periodic review
- Case study assigned: LL Bean, due March 16.

Lecture II: *Multi-Period and Multi-Product Inventory Management* *March 16*

- Optimal availability levels in a multi-product environment.
- Multi-period inventory models.
- Strategies for mitigating inventory risk: quick response, delayed differentiation, etc.
- Case study: LL Bean.
- Lab: Assigned SC Game I. Game length is 5 calendar days, starts in class. Report due March 23.
- Assigned: Problem set 1. Due March 25.

Lecture III: *Facility Design and Warehousing* *March 18*

- Role of warehouses and distribution centers.
- Activities performed inside a warehouse, and optimization of those activities.
- Planning layout of facilities.
- Inventory management: zoning, picking, storage capacity calculations.
- Material flow analysis.
- Assigned: Frito-Lay case study, due March 23.

Lecture IV: Transportation*March 23*

- Road transportation: TL vs. LTL.
- Maritime transportation and port operations.
- Air, rail, intermodal transportation.
- Transportation infrastructure and regulation.
- Trade-off of transportation costs with inventory costs.
- Case study: Frito-Lay.
- Post-game analysis of SC Game I.

Lecture V: Facilities and Network Design*March 25*

- Role of different types of facilities in a logistics network.
- Design choices of overall network (facilities and DC's) for given demand conditions.
- Distribution system design choices
- Lab: LogicNet exercise I.
- Assigned: Problem set 2, includes LogicNet assignment. Due April 1.
- Assigned: Nova, Inc. case study, due March 30.

Lecture VI: Network Design, continued*March 30*

- Impact of design choices on logistics costs, product availability, and responsiveness.
- Calculations and models for assessing costs and product availability levels in distribution systems (incorporating facilities, transportation and inventory costs).
- LP-based exact models for transportation problems (vehicle routing, etc.).
- LP models for overall network optimization.
- Case study: Nova, Inc.

Lecture VII: Performance Analysis and Metrics*April 1*

- Quantities that need to be measured to assess logistics systems performance.
- Characteristics of good metrics and measurement systems.
- Common metrics used in industry.
- Due: Problem set 2.
- Lab: LogicNet exercise II.
- Assigned: Problem set 3, including LogicNet exercises, due April 8.
- Assigned: RFID at the Metro group case study, due April 8.

Lecture VIII: Information and Forecasting*April 6*

- Flows and availability of information in logistics systems.
- IT systems and their use in optimizing performance.
- Forecasting: Using time-series regression to make forecasts, and assessment of forecast accuracy.

Plant tour: Somewhere in the vicinity of this date, we will try and tour a local distribution center. A graded write-up will be due from each student in conjunction with the plant tour.

Lecture IX: *Technology and Finance in Logistics*

April 8

- Role of modern technology: RFID, bar coding, GPS tracking.
- Financial flows and instruments.
- Case study: RFID at the METRO group.
- Due: Problem set 3.
- Assigned: Problem set 4, due April 20.
- Assigned: Case study: Walmart's sustainability strategy, due April 15.

Lecture X: *3PL and Logistics Procurement*

April 13

- Third-party logistics.
- Procurement of logistics services: contracting mechanisms and evaluation.
- Lab: Assigned SC Game II. Game length is 5 calendar days, starts in class. Report due April 20.

Lecture XI: *Globalization and International Logistics; Sustainable Logistics*

April 15

- International logistics: Different processes involved in international logistics systems, and different entities involved.
- Standard UNCTAD contract structures in international logistics: FOB, CIF, DDU, DDP, etc.
- Environmental and sustainability issues in logistics, closed-loop logistics, end-of-life issues.
- Case study: Walmart's Sustainability Strategy.

Lecture XII: *Overall Logistics Strategy*

April 20

- Case-study based illustrations of overall logistics strategies of firms in given environment.
- Post-game analysis of SC Game II.
- Due: Problem set 4.

Final Exam as per RSB schedule. Final review may be offered outside class before final, based on student requests.